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14. ABSTRACT Broadly stated, the Biobehavioral model proposes that what people think and feel affects the state of their health in two fundamental ways: by affecting their behavioral choices (e.g., consumption of alcoholic beverages) and/or by affecting biological processes (e.g., immune defenses) that may affect risk of disease and prognosis. Our Postdoctoral Training Program in Biobehavioral Breast Cancer Research was designed to provide trainees with the necessary intellectual background to do interdisciplinary research and become independent investigators in this underdeveloped area of research. This has been achieved through the implementation of a Core Curriculum, a seminar series, as well as "hands-on" research experience on existing and independent projects under the guidance of experienced mentors. At the conclusion of the program, nine researchers have completed the training.					
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INTRODUCTION:

Despite encouraging news that cancer incidence and mortality rates inched downward in recent years, breast cancer continues to be a preeminent cause of morbidity and mortality among American women. Growing evidence indicates that the "biobehavioral model" of health and disease may have considerable relevance for cancer generally, and breast cancer in particular. Broadly stated, the Biobehavioral model proposes that what people think and feel affects the state of their health in two fundamental ways: by affecting their behavioral choices (e.g., consumption of alcoholic beverages) and/or by affecting biological processes (e.g., immune defenses) that may affect risk of disease and prognosis. Biobehavioral interactions have received increasing attention in breast cancer research over recent years. Through their effects on behavioral choices, cognitive and emotional factors are now recognized to influence women's risk of developing breast cancer, compliance with screening guidelines, interest and uptake in genetic testing, response to treatment, as well as contribute to quality of life among breast cancer survivors. Although there is some evidence that psychosocial interventions may affect survival, the impact of cognitive and emotional effects on biological processes involved in breast cancer incidence, progression, or recurrence has yet to be elucidated. Effects of cognitive and emotional factors on treatment related side effects are increasingly well documented, however. Perhaps reflecting the dearth of investigators with broad-based interdisciplinary training in this area, few studies have explored the possibility that interactions among psychological factors, behavioral choices, and biology may have important implications for breast cancer (e.g., the risk of developing breast cancer may be particularly high among women who have high levels of stress in conjunction with exposure to environmental toxins).

The importance of promoting broad-based research efforts on biopsychosocial and behavioral factors in all aspects of cancer (prevention, detection, diagnosis, treatment, and long term survival) has recently been emphasized in reports prepared by two blue ribbon panels for the National Cancer Institute. These reports have underscored the need for an expanded emphasis on research examining basic behavioral, psychological and social processes, aimed at increasing our understanding of the mechanisms underlying behavioral change (e.g., alcohol consumption) from the individual level (e.g., perceptions of risk) to the group (e.g., family influences) and society (e.g., social class) levels. In addition, the need for new initiatives in biopsychosocial research to explore interactions among biological, psychological, and social processes in cancer etiology, progression and response to treatment, was also emphasized. These reports have further noted the critical need to develop a cadre of highly trained research scientists with the necessary interdisciplinary skills to effectively and efficiently address these complex issues.

Our Postdoctoral Training Program in Biobehavioral Breast Cancer Research was designed to provide trainees with advanced degrees in relevant areas (e.g., epidemiology, medicine, psychology, public health) with the necessary intellectual background needed to "speak the languages" of the multiple relevant disciplines and with the "hands-on" experience under the tutelage of experienced mentors necessary to do interdisciplinary research and become independent investigators in this underdeveloped area of research.

BODY

Detailed progress toward goals: At the completion of four years of our funded program of postdoctoral training, and 2 no-cost extensions, we have completed all the tasks set out in our Statement of Work.

• **Tasks 1 and 3:** Conduct training program for 8 postdoctoral trainees, Months 1-48

a. Recruit postdoctoral trainee applications

Consistent with our proposed developmental plan, we conducted a nation-wide search for applicants for the postdoctoral positions offered and received more than 250 applications from strong candidates around the country.

b. Evaluate potential trainees

After an extensive evaluation process, including in person interviews with the strongest applicants, we made offers to four outstanding candidates, and filled the funded positions. The first class of Trainees included Drs. Julie Britton, Jennifer Egert, Josephine Guevarra, and Tricia Tang. Dr. Guevarra subsequently received an outstanding offer of a position in industry, and therefore resigned from the program. Dr. Youngmee Kim was recruited to replace her. The second class of Trainees consisted of Drs. Ann Fatone, Naa Oyo Kwate, Kristin Tatrow, Daniel David, and Maria Kangas.

c. Develop and schedule Core Curriculum

We initiated and scheduled a series of Core Curriculum lectures presented by members of the faculty of the Mount Sinai School of Medicine (MSSM), supplemented by outside speakers with particular expertise on relevant topics. A sampling of speakers throughout the grant period includes:

- Dr. Christine Ambrosone, Cancer Prevention and Control, MSSM—an integrated series of three lectures on “Grant Writing in Cancer Prevention and Control;”
- Dr. Andreas Bollinger, Boston University School of Medicine—“Posttraumatic Stress Disorder: A Brief History of Diagnostic, Epidemiological and Treatment Issues;”
- Dr. Karen Hurley, Memorial Sloan Kettering Cancer Center—“Techniques in Clinical Research Interviewing;”
- Dr. Steven Itzkowitz, Department of Medicine/Gastroenterology, MSSM—“Colon Cancer Screening 2004;”
- Dr. Jonathan Karp, Rider University—“An Introduction to Psychoneuroimmunology in Cancer: Analyses of Biobehavioral Responses to Chemotherapy Animal Models;”
- Dr. Diane Meier, Departments of Geriatrics and Medicine, MSSM—“Cancer and Palliative Care;”
- Dr. Alfred I. Neugut, Columbia University—“Using Large-Scale Databases for Policy Making in Cancer Prevention;”
- Dr. George Raptis, Department of Medicine, MSSM—an integrated series of three lectures entitled: “An introduction to the pathobiology of breast cancer;” “The clinical management of early stage breast cancer;” and “The treatment of metastatic breast cancer;”
- Dr. Carolyn Schwartz, University of Massachusetts Medical School—“The Challenge of Response Shift for Medical Outcomes Research;”
- Dr. Gary Winkel, City University of New York—mini course introducing advanced statistical analysis with SAS.

d. Schedule Seminar Series

In addition to the Core Curriculum, we supported a series of research seminars by Mount Sinai faculty and outside speakers to provide Trainees with exposure to recent developments in Biobehavioral Medicine, as well as related disciplines, for example:

- Dr. William Breitbart, Memorial Sloan Kettering Cancer Center—“Spirituality and Meaning in Cancer: Meaning-Centered Group Psychotherapy;”
- Dr. Martin Fishbein, University of Pennsylvania—“A Reasoned Action Approach to Health Promotion;”
- Dr. Victor Grann, Mailman School of Public Health, Columbia University—“Genetic Testing for Ashkenazi Jewish Women who Test Positive for either BRCA1 or BRCA2 Mutations—A Decision Analysis;”

- Dr. Mark Litt, University of Connecticut Health Center—"Situational Antecedents to Smoking and Drinking in Alcoholic Smokers: Analysis of Experience Sampling Data;"
 - Dr. Libby Morimoto, Fred Hutchinson Cancer Research Center—"Breast and Colorectal Center: Hormones, Obesity and IGFs;"
 - Dr. Kim Morland, Department of Community & Preventive Medicine, MSSM—"Diet and Cancer, does your neighborhood matter?"
 - Dr. Bruce Rapkin, Memorial Sloan Kettering Cancer Center—"The ACCESS Cancer Education and Outreach Program;"
 - Dr. Annette Stanton, University of Kansas—"Expressing Emotions and Finding Benefits: Adaptive Strategies for Breast Cancer Patients;"
 - Dr. Camille Wortman, State University of New York at Stonybrook—"Variability in Responses to the Loss of a Loved One: Cultural Understanding Vs' Scientific Evidence;"
 - Dr. Rachel Yehuda, Department of Psychiatry, MSSM—"Biological Alterations in PTSD: Relevance to Cancer."
- e. Run Core Curriculum and Seminar Series
As indicated above, both the Core Curriculum and Seminar Series were successful.
- f. Establish "hands-on" research experience for each fellow
We continued our emphasis hands-on portion of the training program through the active mentoring of trainees by federally-funded faculty members.
- g. Schedule and Run Luncheon Lecture series
The Luncheon Lecture series (sometimes rescheduled as the "Bagel Breakfast" meeting), covering recent journal articles and works in progress and grant reviews by local investigators, was scheduled and run. In addition, many of the outside speakers brought in for the Core Curriculum and Seminar Series graciously agreed to do an informal Career Development Seminar for Trainees over lunch on the day of their research seminar presentation. Some recent journal articles discussed follow:
- Abercrombie HC, Giese-Davis J, Sephton S, Epel ES, Turner-Cobb JM, Spiegel D. (2004). Flattened cortisol rhythms in metastatic breast cancer patients. Psychoneuroendocrinology, 29(8);1082-1092.
 - McGregor BA, Antoni MH, Boyers A, Alferi SM, Blomberg BB, Carver CS. (2004) Cognitive-behavioral stress management increases benefit finding and immune function among women with early-stage breast cancer. J Psychosom Res. 56(1):1-8.
- h. Guide development of independent research project for each Trainee
Guidance in the development of independent research projects has been provided by the mentors for each Trainee, as well as by feedback from other members of the faculty made more informally as part of the Luncheon Lecture series.
- i. Provide oversight for each Trainee's independent project
Oversight for each Trainee's independent project is being provided by their Mentor and more informally by the rest of the faculty at Work-in-Progress (WIP) presentations as part of the Luncheon Lecture series.
- j. Conduct formal evaluations of Trainees and Program
Trainees and the Program were formally evaluated around the end of each Trainee's first year.

k. Facilitate preparation of research reports and grant applications

In the first year of each Trainee's participation in the program, the focus was on the preparation of research reports from previous relevant research they may have conducted before joining the program, the preparation of research reports from the data collected from projects previously collected by their Mentors, and the preparation of initial reports concerning data which they collected during their first year of the Program. In their second year of the Program, Trainees were encouraged to seek funding for individual research projects. The development of Trainee's skills in grant writing has been fostered by one-on-one tutorials about the process as their Mentors have written and submitted grants, as well as by participation in our "in-house" grant review meetings in which faculty present their preliminary drafts of applications

• **Task 2 and 4:** Prepare and submit required reports for BCRP, Months 12, 14, 36, 48

Annual reports were completed and submitted to the USAMRMC.

Brief description of former trainees and their activities: (Listed alphabetically)

Dr. Julie Britton: Dr. Britton received a Ph.D. in Epidemiology from Columbia University, in New York City. Her primary research interest is the role energy balance (diet, physical activity and body size) in relation to breast cancer risk. She was recently awarded an NIH Academic Career Award (K07) to support her career development in this area of research. Dr. Britton is currently a Research Assistant Professor in the Department of Community Medicine at the Mount Sinai School of Medicine in New York City.

Dr. Daniel David: Dr. David received a Ph.D. in Psychology from Babes-Bolyai University, Cluj-Napoca, Romania. His primary research interest is the theoretical and empirical implications of cognitive science and cognitive-behavioral therapy with a particular interest in Rational Emotive-Behavior Therapy (REBT) and its application to clinical populations, including breast cancer patients. Dr. David is currently an Associate Professor in the Department of Psychology at Babes-Bolyai University, Cluj-Napoca, Romania.

Dr. Jennifer Egert: Dr. Egert received a Ph.D. in clinical psychology from Duke University, Durham, North Carolina. Her primary research interest is the psychological impact of life threatening illness, including breast cancer. Dr. Egert is currently an Assistant Clinical Professor of Psychiatry at New York University in New York City.

Dr. Anne Fatone: Dr. Fatone received a Ph.D. in Clinical & Health Psychology from Yeshiva University in New York, NY. Her research has focused on the effects of psychosocial factors in participation of medical minority populations in cancer prevention efforts. Most of her work has involved residents of East Harlem, NYC and has been conducted through our NCI funded East Harlem Partnership for Cancer Awareness. Dr. Fatone is currently an Instructor in the Departments of Medicine and Oncological Sciences at the Mount Sinai School of Medicine.

Dr. Josephine Guevarra: Dr. Guevarra received a Ph.D. in psychology from the City University of New York, New York, NY. Her primary research interest has been the impact of cultural and racial factors on psychological adjustment and screening behavior among women with family histories of breast cancer. Dr. Guevarra is currently a Senior Marketing on the Corporate Brand Strategy Market Intelligence team at IBM in Armonk, New York.

Dr. Maria Kangas: Dr. Kangas received a Ph.D. in Psychology from the University of New South Wales, Australia. Her research focuses on post traumatic stress disorder and the theoretical and empirical implications of considering cancer and its treatment to be a traumatic event. Dr. Kangas is currently a Lecturer at Macquarie University in Sydney Australia.

Dr. Youngmee Kim: Dr. Kim received a Ph.D. in Social Psychology from the University of Rochester, Rochester, NY. Her primary research interest is the influence of family relationships on health and disease, including breast cancer. Dr. Kim is currently the Director of Family Studies, at the Behavioral Research Center of the American Cancer Society in Atlanta, Georgia.

Dr. Naa Oyo A. Kwate: Dr. Kwate received a Ph.D. in Clinical Psychology from St. John's University in New York. Her research focuses on health disparities in cancer prevention and control. In one recent paper (see below), she reported that the experience of racism in African American women is associated with increased health risks. Dr. Kwate is currently an Associate Research Scientist at the Mailman School of Public Health, Columbia University.

Dr. Tricia Tang: Dr. Tang received a Ph.D. in Clinical Psychology from the University of Vermont. During her fellowship, her primary research interest was the influence of cultural factors on cancer prevention and control in underserved communities. Dr. Tang is currently the Director of the Multiculturalism and Health Program and an Assistant Professor in the Department of Medical Education at the University of Michigan Medical School.

Dr. Kristin Tatrow: Dr. Tatrow received a Ph.D. in Clinical Psychology from The State University of New York – Albany. Her research focuses on psychological aspects of pain due to various conditions in women. She is also interested in the investigation of the effectiveness of cognitive-behavior therapy for reducing pain and psychological distress in breast cancer patients. In one recent paper (see below), she reported that patients with higher activity levels had less distress prior to breast surgery for cancer. Dr. Tatrow is currently an Associate Research Scientist at the Institute for Trauma and Stress, NYU School of Medicine.

KEY RESEARCH ACCOMPLISHMENTS:

Conducted training program for ten Postdoctoral Trainees

- Recruited trainee applications
- Evaluated potential trainees
- Developed and scheduled Core Curriculum
- Scheduled Seminar Series
- Ran Core Curriculum and Seminar Series
- Established “hands-on” research experience for each Trainee
- Scheduled and ran Luncheon Lecture / Bagel Breakfast series
- Guided development of independent research projects for each Trainee
- Provided oversight for each Trainee's independent project
- Conducted formal evaluations of Trainee and Program
- Facilitated preparation of research reports and grant applications

REPORTABLE OUTCOMES:

Papers and book chapters for the years since each Trainee began the training program are grouped alphabetically by Trainee:

DR. JULIE BRITTON:

- Britton JA, Westhoff C, Howe G, Gammon MD (2000). Diet and benign ovarian tumors (United States). Cancer Causes and Control, 11(5): 389-401.
- Westhoff C, Britton JA, Gammon MD, Wright T, Kelsey J (2000). Oral contraceptives and benign ovarian tumors. American Journal of Epidemiology, 152(3): 242-246.
- Britton JA, Westhoff C, Howe GR, Gammon MD (2000). Lactose and benign ovarian tumors in a case-control study. British Journal of Cancer, 83(11): 1552-1555.
- Stellman SD, Djordjevic MV, Britton JA, Muscat JE, Citron ML, Kemeny M, Busch E (2000). Breast cancer risk in relation to adipose concentrations of organochlorine pesticides and polychlorinated biphenyls in Long Island, New York. Cancer Epidemiology, Biomarkers & Prevention, 9: 1241-1249.
- Britton JA, Gammon MD, Kelsey JL, Brogan DJ, Coates RJ, Schoenberg JB, Potischman N, Swanson CA, Stanford JL, Britton LA (2001). Characteristics associated with recent recreational exercise among women 20 to 44 years of age. Women & Health, 31: 81-96.
- Gammon MD, Neugut AI, Santella RM, Teitelbaum SL, Britton JA, et al (2002). The Long Island Breast Cancer Study Project: Description of a multi-institutional collaboration to identify environmental risk factors for breast cancer. Breast Cancer Research and Treatment, 74: 235-254.
- Gammon MD, Santella RM, Neugut AI, Eng SM, Teitelbaum SL, Paykin A, Levin B, Terry MB, Young TL, Wang LW, Wang Q, Britton JA, et al (2002). Environmental toxins and breast cancer on Long Island. I. Polycyclic aromatic hydrocarbon DNA adducts. Cancer Epidemiology Biomarkers & Prevention, 11(8): 677-685.
- Gammon MD, Wolff MS, Neugut AI, Eng SM, Teitelbaum SL, Britton JA, et al (2002). Environmental toxins and breast cancer on Long Island. II. Organochlorine compound levels in blood. Cancer Epidemiology Biomarkers & Prevention, 11(8): 686-697.
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- Wolff MS, Britton JA, Wilson VP (2003). Environmental Risk Factors for Breast Cancer Among African-American Women. Cancer, 97(1 Suppl): 289-310.
- Teitelbaum SL, Britton JA, Gammon MD, Schoenberg JB, Brogan DJ, Coates RJ, Daling JR, Malone KE, Swanson CA, Britton LA (2003). Occupation and breast cancer in women 20 to 44 years of age. Cancer Causes and Control, 14(7): 627-637.
- Kabat GC, O'Leary ES, Schoenfeld ER, Greene JM, Grimson R, Henderson K, Kaune WT, Gammon MD, Britton JA, Teitelbaum SL, Neugut AI, Leske MC for the EBCLIS group (2003). Electric Blanket Use and Breast Cancer on Long Island. Epidemiology, 14(5): 514-20.
- Muscat JE, Britton JA, Djordjevic MV, Citron ML, Kemeny M, Busch-Devereaux E, Pittman B, Stellman SD (2003). Adipose concentrations of organochlorine compounds and breast cancer recurrence in Long Island, New York. Cancer Epidemiology Biomarkers & Prevention, 12: 1474-1478.

- Britton JA, Wolff MS, Lapinski R, Forman J, Hochman S, Kabat GC, Godbold J, Larson S, Berkowitz GS (2004). Characteristics of pubertal development in a multi-ethnic population of nine-year old girls. Annals of Epidemiology, 14: 179-187.
- Terry MB, Gammon, Zhang F, Tawfik, Teitelbaum SL, Britton JA, Subbaramaiah K, Dannenberg AJ, Neugut AI (2004). Effects of Frequency and Duration of Aspirin Use and Hormone Receptor Status on Breast Cancer Risk. Journal of the American Medical Association, 291(20): 2433-2440.
- Gammon MD, Sagiv SK, Eng SM, Shantakumar S, Gaudet MM, Teitelbaum SL, Britton JA, Terry MB, Wang LW, Wang Q, Stellman SD, Beyea J, Hatch M, Kabat GC, Wolff MS, Levin B, Neugut AI, Santella RM. Polycyclic aromatic hydrocarbons (PAH)-DNA adducts and breast cancer: a pooled analysis. Archives of Environmental Health (in press)
- Gammon MD, Eng SM, Teitelbaum SL, Britton JA, Kabat GC, Hatch M, Paykin AB, Neugut AI, Santella SM (2004). Environmental Tobacco Smoke and Breast Cancer Incidence. Environmental Research, 96(2): 176-85.
- Gaudet MM, Britton JA, Kabat GC, Steck-Scott S, Eng SM, Teitelbaum SL, Terry MB, Neugut AI, Gammon MD (2004). Intake of vegetables, fruits, and antioxidant vitamins and breast cancer among women in the Long Island Breast Cancer Study Project. Cancer Epidemiology, Biomarkers, and Prevention, 13(9): 1485-94.
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- Britton JA, Wetmur J, Kadlubar F, Berkowitz G, Teitelbaum SL, Wolff MS. (submitted) Joint consideration of steroid gene polymorphisms and obesity in relation to breast pubertal status. Cancer Epidemiology, Biomarkers and Prevention.
- Brooks DR, Stellman SD, Palmer JR, Herren TC, Muscat JE, Britton JA. (submitted) Effect of cigarette tar yield on risk of lung cancer among long-term smokers: a multicenter case-control study. Epidemiology
- Teitelbaum SL, Gammon MD, Britton JA, Neugut AI, Levin B, Stellman SD. (submitted) Reported pesticide use and breast cancer on Long Island, NY. Epidemiology.
- Eng SM, Gammon MD, Terry MB, Kushi LH, Teitelbaum SL, Britton JA, Neugut AI. (submitted) Body size changes in relation to postmenopausal breast cancer among women on Long Island, New York. American Journal of Epidemiology.

DR. DANIEL DAVID:

- David D, King B (2001). Cognitive inhibition and hypnotizability. Cognition Brain and Behavior (Cognitie, Creier, Comportament), 1-2: 197-213 (English).
- David D, Brown R (2001). The impact of directed forgetting instructions on implicit and explicit memory. Erdelyi Pszichologiai Szemle, 2: 67-89 (English).
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DR. JENNIFER EGERT:

- Keefe FJ, Lefebvre J, Egert JR, Affleck G, Sullivan MJ, Caldwell DS (2000). Catastrophizing mediates the relationship of gender to pain and pain-related outcomes in osteoarthritis patients. Pain, 87: 325-334.
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DR. MARIA KANGAS:

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DR. KRISTIN TATROW:

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PERSONNEL RECEIVING PAY FROM TRAINING GRANT:

- Dr. Dana Bovbjerg, Principal Investigator
- Dr. William Redd, Co-Principal Investigator
- Ms. Dorothy Parks, Administrative Support
- Dr. Julie Britton, Fellow
- Dr. Daniel David, Fellow
- Dr. Jennifer Egert, Fellow
- Dr. Anne Fatone, Fellow
- Dr. Josephine Guevarra, Fellow
- Dr. Maria Kangas, Fellow
- Dr. Youngmee Kim, Fellow
- Dr. Naa Oyo Kwate, Fellow
- Dr. Tricia Tang, Fellow
- Dr. Kristin Tatrow, Fellow

CONCLUSIONS:

We have successfully completed the Technical Objectives of the Postdoctoral Training Program in Biobehavioral Breast Cancer Research:

- Aim 1. To provide postgraduate trainees a broad-based intellectual background needed to conduct interdisciplinary biobehavioral breast cancer research through structured didactic training (e.g., Core Curriculum Lecture Series, Advanced Seminars) and informal interactions with the Training Faculty and other active researchers.
- Aim 2. To teach Trainees interdisciplinary research skills through hands-on participation in ongoing federally-funded breast cancer research programs of the Training Faculty and by having Trainees develop and conduct their own related biobehavioral research projects with the guidance of their research Mentors.
- Aim 3. To foster the development of Trainees' independent research careers in biobehavioral breast cancer research through both formal instruction and direct experience with writing research papers and grants, under the direct tutelage of their Mentors.